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# THE EASTERN TENT CATERPILLAR

W. E. Britton

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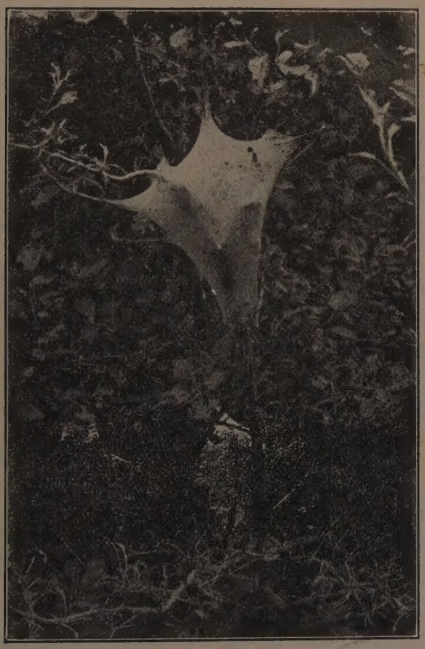

Connecticut
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FIGURE 1. Tent caterpillars resting on the outside of the nest.

# THE EASTERN TENT CATERPILLAR*

*Malacosoma americana* Fabr.

W. E. Britton

## OUTBREAKS IN NEW ENGLAND

Outbreaks of the eastern tent caterpillar in New England have been recorded in published literature ever since the earliest records of Colonial times. At least in 1646 the pest was exceedingly abundant, as it has been in certain other seasons. Peak periods were termed "caterpillar years" by the settlers. Probably the species is present every season throughout its range and somewhere appears in large numbers each year. In the New England states the periods of abundance occur at more regular intervals than elsewhere, varying from 8 to 12 years apart. In Connecticut they come every 10 or 11 years and the writer has observed the insect during four of these periods, as follows: 1902-1903, 1913-1914, 1924 and 1935.

Evidently the eastern tent caterpillar is held in check chiefly by its parasites. When it is abundant, the parasites have an ample food supply and are able to multiply rapidly. When the parasites reach a certain maximum point, they overcome the tent caterpillar, which then rapidly decreases in numbers, so that within four or five years only an occasional nest may be seen. However, this pest is never exterminated. As its numbers are depleted, the parasites have less and less food and likewise decrease. Thus when the tent caterpillar becomes scarce the parasites are likewise scarce, giving the pest a chance to multiply again. So the cycle is repeated. It is a constant seesaw between the tent caterpillar and its parasites.

## COMMON NAME

Several popular names have been applied to this insect by writers on economic entomology. Some of these names are: "American Lackey Worm," "American Lackey Caterpillar," "American Lackey Moth," "Apple-tree Caterpillar," "Apple Web-Worm," "Tent Caterpillar," "American Tent Caterpillar," "Orchard Tent Caterpillar" and "Apple-tree Tent Caterpillar". In order to distinguish this insect from the species occurring on the Pacific Coast, the American Association of Economic Entomologists has voted to adopt the common name of "Eastern Tent Caterpillar".

* A revision of Bulletin 177, rewritten and enlarged.

## EVIDENCE OF DAMAGE

The conspicuous white nests of the eastern tent caterpillar in the forks of branches during the month of May show everybody that the insect is present. In ordinary seasons most of the nests are on several species of wild cherry, upon which the caterpillars feed. In years of great abundance it infests apple (see Figure 2) and other fruit trees, and becomes an orchard pest. Although not so important as several other orchard insects, it is surely one of the most noticeable. Unsprayed trees may be defoliated, as shown in Figure 3, and although this occurs early in the season and the trees put out new leaves, it weakens them appreciably. As a rule they are unable to produce fruit buds for the following year. This damage should be prevented if possible.

FIGURE 2. Apple tree almost defoliated, near Waterbury.

The nests on trees in hedgerows and along the roadsides (see Figure 4) are always unsightly and mar the beauty of the landscape, even if only worthless trees are infested. The owner should remove all worthless trees and take care of the others. The control of the tent caterpillar is not difficult and there is no good reason for allowing the pest to multiply unchecked.

## OUTBREAKS IN CONNECTICUT

Although the nests are seen every spring in Connecticut, the insect has usually been somewhat less destructive here than in northern New England. Normally the wild cherry furnishes the common food supply. It is only during the periods of great abundance that the nests occur on all kinds of fruit trees as well as on other kinds of trees not commonly infested.

In 1902, the tent caterpillar was extremely abundant everywhere. One grower reported the insect as the most troublesome pest of his peach trees. Black cherry and chokecherry bushes along roadsides and hedgerows were stripped of leaves, as were most unsprayed apple and other fruit trees. According to the observations of the writer, the outbreak was not local. It occurred throughout the State but was somewhat more severe in the northern portion. The three agents employed by the Station to collect fruit statistics covered all of Connecticut and reported defoliated trees in nearly every town. The writer made similar observations in parts of the State where he had occasion to travel. Moreover, of all orchard insects, the tent caterpillar was the one most commonly reported to this office by the fruit growers. The late Mr. T. S. Gold believed that the pest had not been so abundant for 66 years, or since the terrible ice storm of 1836.

FIGURE 3. Apple trees defoliated by tent caterpillars.

In 1903 the caterpillars and their nests were very numerous, though perhaps less so than in 1902. Mr. J. M. Whittlesey of Morris wrote that he had never seen so many nests in his neighborhood, but that most of the caterpillars died before reaching maturity. For several years after this outbreak, the tents were not much in evidence. A few could be found anywhere, but the caterpillars did no particular damage and little attention was paid to them.

In 1911 and 1912, a number of specimens and inquiries regarding them were received from various parts of the State. Early in 1913 many egg-clusters were sent to the Station, and when the trees put out their leaves in May, it was evident that 1913 was a "caterpillar year," as more nests were present than at any time since 1902. Around New Haven they

were moderately abundant, but back a few miles from the coast, every neglected apple tree, every black cherry tree and every chokecherry bush had from one to 15 or 20 nests, and many apple trees were stripped, as shown in Figure 2. At Stonington, which is a coast town, the caterpillars were extremely abundant, and many trees were defoliated. In Litchfield County the nests were very numerous and were so reported from Salisbury and Norfolk. The writer observed them in portions of Roxbury, Washington and Woodbury, and in Woodbury saw scrub oak that had been stripped. Occasional nests were seen on other kinds of trees not commonly infested. Also in Waterbury, Middlebury and Southbury, in New Haven County, nearly all roadside apple and wild cherry trees, as well as neglected orchard trees, were stripped. Many caterpillars died from a wilt disease and were found stuck around on fences, buildings, stone walls and the trunks of trees.

FIGURE 4. Nests on chokecherry bushes.

Prizes for collecting and destroying egg-clusters were offered to school children by various civic and improvement associations and other organizations in many towns, and the Extension Service of the Connecticut State College offered prizes in a contest covering the entire State. In Newtown, prizes were awarded for the collection of nests.

In 1924 the eastern tent caterpillar was again abundant throughout the State, particularly so in the western portion. However, this outbreak did not seem to be quite so severe as that of 1913. In 1925 there were fewer nests, and the pest was on the decrease.

Then for several years this insect was not noticeable, but by 1933 it attracted attention again. The following season nests were particularly abundant in Litchfield County, and less so in the shore region. In 1935

probably the nests were as numerous as in 1913. Never before were so many mail and telephone inquiries received at the Station. Although information and warnings were issued in the newspapers, many persons were not impressed until their trees were covered with tent caterpillar nests. Then they thought the State ought to do something about it. Many, many apple trees and wild cherry trees were entirely stripped of leaves by June 1, and only the unsightly nests and the bare trunks and branches remained. Nests and caterpillars were also found on trees other than the usual food plants. The fact that the wilt disease was observed in some localities indicates that the insect will be less prevalent next season. However, there were plenty of cocoons, and a large number of moths emerged. Later, egg-clusters were extremely common on the twigs.

Contests among school children were carried on in Danbury, New Milford, and in many other places.

## DISTRIBUTION

The eastern tent caterpillar is a native of North America and occurs throughout the eastern United States and Canada, and westward to the Rocky Mountains. Damage has been recorded since 1646, and outbreaks seem to be more severe and occur with greater regularity in the northeastern states, particularly in northern New England, than in other sections of the United States.

## FOOD PLANTS

Certain species of wild cherry are the favorite and probably the natural food plants of the eastern tent caterpillar. This is particularly true of the black cherry, *Prunus serotina*, chokecherry, *Prunus virginiana*, and bird or fire cherry, *Prunus pennsylvanica*. The apple seems to be the next choice. However, the other species of cherry and plum, both wild and cultivated, are fed upon to some extent, as is also the peach. Although the apple is commonly infested, the fruiting and flowering crabs are sometimes attacked, and the shadbushes or service berries, *Amelanchier canadensis*, and other species are not exempt. Lowe* mentioned cherry, apple, plum, peach, rose, witch-hazel, beech, barberry, oak, willow and poplar as food plants. Sometimes the caterpillars feed upon gray birch, *Betula populifolia*, and perhaps other species of birch, and the writer has occasionally found them eating the leaves of various kinds of oak. In Woodbury in 1913, he observed the old nests on river beech, *Carpinus caroliniana*, and on hop hornbeam, *Ostrya virginiana*.

## HABITS AND LIFE HISTORY

The eggs are laid in cylindrical clusters encircling small twigs of the apple and cherry, during the last days of June or first of July. Specimens in breeding cages in the laboratory laid eggs soon after the middle of June, but this is somewhat earlier than they are laid out of doors. After depositing an average of more than 200 eggs in a band, the parent moth

* New York Agr. Expt. Station (Geneva) Bul. 152, page 281, 1898.

covers them with a viscid fluid which hardens, giving them a varnished appearance. Probably this coating is a great protection against the weather and predaceous insects. (See Figures 5 and 12.)

The eggs do not hatch until the following April, thus remaining upon the twigs for about nine months. The tiny caterpillars first feed upon the frothy mass surrounding the eggs, and next attack the new leaves which are then unfolding. After a few days they spin many silken threads to form their nest, usually in a fork of the branches. (See Figures 6, 7 and front page of bulletin.)

Each nest, or colony, contains the caterpillars from a single cluster of eggs. In fair weather the insects feed in the morning and again in the afternoon, and, according to Fitch, again at night; but during cloudy weather they remain in the nest. In 1935, Mr. M. P. Zappe of this department examined infested chokecherry bushes several times between dusk and midnight and always found the caterpillars in the nest. When nearly full grown, the caterpillars may often be found at rest on the outside of the tent, as shown in Figure 1. They spin threads wherever they crawl along the branches from the nest to their feeding places.

FIGURE 5. Egg-cluster, natural size.

FIGURE 6. Nest on chokecherry.

The egg-clusters do not all hatch at the same time, and it is not uncommon to find half-grown and newly-hatched caterpillars in the same vicinity. Mr. Whittlesey stated in a letter to the writer that during the spring of 1902 the hatching period extended over nearly 21 days.

The average feeding period is about six weeks, during which time the caterpillars molt, or cast their skins, several times. As they increase in size they become more voracious and devour the leaves rapidly. At each molting period they stop feeding for a few hours, only to begin again with renewed vigor.

When fully grown, the caterpillars cease eating and wander about restlessly for a day or two. Then they spin white, silken cocoons in the grass under the trees, in the crevices of the rough bark, or on buildings, boxes and rubbish that may be near the infested trees. (See Figure 9.)

There is only a single brood each year.

FIGURE 7. Nest showing young caterpillars.

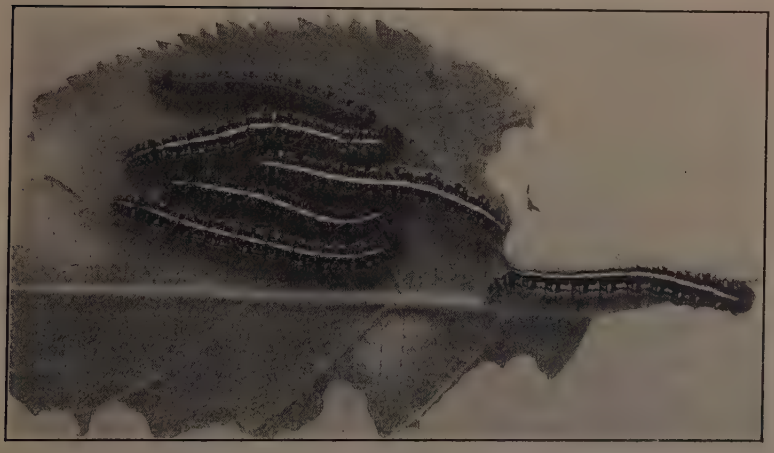

FIGURE 8. Tent caterpillars, partially grown. Natural size.

A colony of tent caterpillars was brought into the laboratory on May 1. The nest had been formed, though the caterpillars were small, measuring about three-sixteenths of an inch in length, and had probably been hatched about a week. On May 26 they were full grown and three or four had pupated. In a week, all had made their cocoons, and by June 10, the adults began to emerge. This continued for nearly a week, until all had come forth. Meantime several egg-clusters had been deposited by the females in the breeding cage.

## DESCRIPTION

**Egg:** The eggs are gray in color and very small, about one-eighteenth of an inch long, and slightly more than half as thick. The upper end is circular, and is a little larger than the lower end. They are placed on end, close together, and covered one-sixteenth of an inch deep with a brown substance resembling glue. The egg-cluster usually encircles the twig, but is sometimes deposited on one side only. Egg-clusters are shown in Figures 5 and 12.

FIGURE 9. Cocoons of tent caterpillar. Natural size.

**Larva:** When first hatched, the caterpillar is very small and nearly black, with a few gray hairs. It molts five or six times as it increases in size, and after each molt the markings show more distinctly. When full grown the caterpillar is from two to two and one-half inches in length and is thinly covered with long, light brown hairs. The color is black with a white stripe along the back, and many short, irregular, brownish stripes, or markings, along the side of each segment. The sides are of a bluish color and each segment bears an oval blue spot nearly surrounded by black. The undersides of the body, head, and legs are black. The larvae, natural size, are shown in Figure 8.

**Pupa:** The pupa stage is passed in a white, oval cocoon, which is about one inch in length and half an inch in thickness. It is made of loosely woven, silken threads, spun by the caterpillar, and is usually attached by one side to some object in a more or less protected place. Figure 9 shows a few of the cocoons.

**Adult:** The adult is a four-winged moth of light, reddish brown color, with two whitish stripes extending obliquely across each forewing. The female has a wing expanse of about one and one-half, and the male about one and one-eighth, inches. The males are inclined to be somewhat darker in color than the females, though there is much variation in the intensity of the ground color and of the markings in both sexes. The rear wings are the same color as the forewings, but are not marked with white stripes. Both sexes are shown in Figure 10.

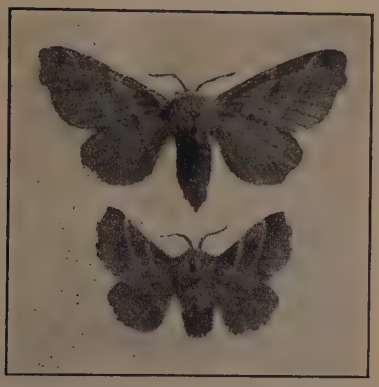

FIGURE 10. Moths of the eastern tent caterpillar. Female above. Natural size.

FIGURE 11. Moths of the forest tent caterpillar. Female above. Natural size.

## CONFUSION WITH OTHER INSECTS

Although the eastern tent caterpillar is one of the commonest and most familiar of all injurious insects, it is often confused with other pests, particularly the bagworm and the fall webworm. In fact, it is frequently called the bagworm. In order that the reader may be able to distinguish between these insects, illustrations and brief descriptions are included here.

### Forest Tent Caterpillar, *Malacosoma disstria* Hubn.

This insect is called the forest tent caterpillar because it is closely related to the eastern tent caterpillar. However, it makes no nest, and during most of the larval period the caterpillars feed independently. When nearly full grown, they cluster on the trunks of trees in much the same manner as the eastern tent caterpillars cluster on the outside of the nest. The forest tent caterpillar is generally pale blue in color, with a row of keyhole-shaped white spots, instead of a stripe, along the back. It feeds upon fruit, shade and deciduous forest trees, and at times has defoliated large woodland areas in Vermont, New Hampshire and northern New York. The caterpillars are shown in Figure 14 and the adults in Figure 11. The egg-cluster, Figure 13, has the ends squared off and

less pointed than that of the eastern tent caterpillar, shown in Figure 12. The moths, also, are somewhat paler than those of the eastern tent caterpillar, and have dark, instead of white, diagonal markings on the forewings.

FIGURE 12. Egg-cluster of eastern tent caterpillar. Natural size.

FIGURE 13. Egg-cluster of forest tent caterpillar. Natural size.

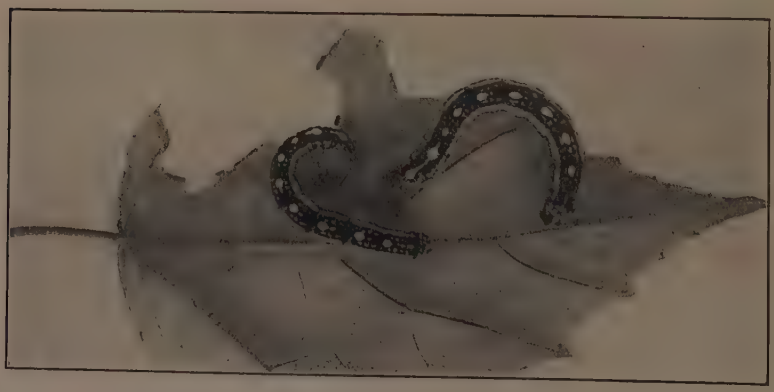

FIGURE 14. Forest tent caterpillars. Natural size.

**Fall Webworm, *Hyphantria cunea* Drury.**

Many persons confuse the fall webworm with the eastern tent caterpillar. But the nests of the former are present in late summer and autumn on the ends of branches, and the caterpillars feed inside; whereas the nests of the latter are formed in May in the forks of trunk and branches, and the caterpillars go out to feed.

The fall webworm belongs to the Family Arctiidae and is partially double-brooded in Connecticut. A few early nests may be seen the latter part of June, and from these a second generation may develop. But most of the moths emerge later and the caterpillars make webs on the trees in late July, August and September. In some localities it is called the "August caterpillar." When the food within the nest has been devoured, this pest extends its web to enclose fresh leaves, sometimes covering an entire branch. The fall webworm feeds upon nearly every kind of fruit, shade and woodland tree, and although present each year, in certain seasons is so abundant that the nests may be seen along the roadsides everywhere throughout the State. The appearance of the nests is shown in Figure 15, the egg-mass in Figure 16, and the moth in Figure 17.

Figure 15. Nests of fall webworm. (After Slingerland.)

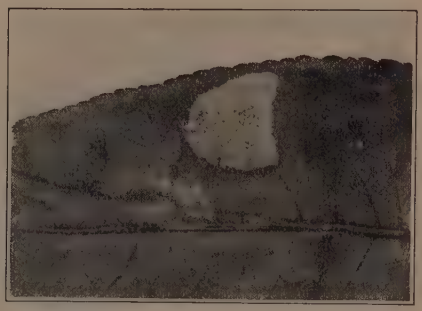

FIGURE 16. Egg-mass of fall webworm. Natural size.

FIGURE 17. Fall webworm moth. Natural size.

**Bagworm, *Thyridopteryx ephemeraeformis* Haw.**

This insect belongs to the Family Psychidae and occurs from Connecticut southward. Each larva makes a case, or bag, to which is attached small pieces of the foliage of the plant upon which it feeds. This bag is carried wherever the insect crawls about, and finally is attached to a twig, where it remains suspended during the winter, as shown in Figure 18. In the fall the larva pupates in the case. The males emerge and mate with the wingless females, which remain to lay eggs in their cases before they wriggle out and die. The eggs hatch the following spring.

This insect feeds upon many different kinds of trees. It was found on Norway maple in Bridgeport in 1934 and in New Haven in 1935. It seems to be particularly fond of arborvitae and red cedar and is often shipped into Connecticut on young nursery trees.

## NATURAL ENEMIES

The eastern tent caterpillar is usually held in check by its natural enemies, and without them would doubtless be more prevalent and destructive each season. Its extreme abundance in "caterpillar years" is undoubtedly due to a comparative scarcity of these foes, thus allowing the species to multiply almost unchecked. Among its natural enemies are parasitic and predaceous insects, a bacterial disease and certain species of birds.

FIGURE 18. The bagworm.
Natural size.

Probably the most important are the insect parasites. Quaintance* mentioned three egg parasites, *Telenomus clisiocampae* Riley, *Pteromalus* sp. and *Platygaster* sp., that have been recorded from the egg-clusters of the eastern tent caterpillar. Yet it is in the caterpillar and cocoon stages that the highest parasitism occurs, and Fiske**, in New Hampshire, recorded 24 species of four-winged flies reared from the tent caterpillar. The following 12 of these were primary parasites:

*Hyposoter* (*Ameloctonus*) *clisiocampae* Weed
*Labrorychus* (*Anomalon*) *analis* Say
*Paranomalon* (*Anomalon*) *exile* Provancher
*Apanteles clisiocampae* Ashmead
*Microbracon* (*Bracon*) *gelechiae* Ashmead
*Psychophagus* (*Diglochis*) *omnivorus* Walker
*Hyposoter* (*Limneria*) *fugitivus* Say
*Ephialtes* (*Pimpla*) *conquisitor* Say
*Scambus* (*Pimpla*) *inquisitoriellus* D. T.
*Ephialtes* (*Pimpla*) *pedalis* Cresson
*Rhogas intermedius* Cresson
*Spilocryptus extrematis* Cresson

* Bureau of Entomology, Circular 98, page 5, 1908.
** New Hampshire Agr. Expt. Station, Tech. Bul. 6, page 2, 1903.

Fiske estimated that between 15 and 20 per cent of the tent caterpillar larvae and pupae are destroyed each season by these parasites. Lowe*, in New York, reared *Pimpla conquisitor* Say, *P. pedalis* Cresson, *Spilocryptus extrematis* Cresson, and also *Theronia fulvescens* Cresson, and *Mesostenus* sp., from the cocoons, and concluded that the degree of parasitism was about 80 per cent. In 1913, a large number of specimens of *Scambus coelebs* (Walsh) were reared from this insect in Connecticut. Other species that have been recorded as parasites are *Ephialtes aequalis* (Provancher), *Theronia melanocephala* Brulle and *Apanteles rufocoxalis* Riley. A Tachinid fly, *Frontina frenchii* Williston, has also been reared from the eastern tent caterpillar.

The Ichneumonid parasites are common in Connecticut, and *Ephialtes conquisitor* Say, shown in Figure 19, has been one of the commonest. Of 354 cocoons collected in Stonington in 1913, 140 produced Ichneumon flies, 7 Tachinid flies, and the moths emerged from 207. This shows a parasitism of 41.5 per cent.

Several predaceous insects, including the larger ground beetles of the genus *Calosoma*, and soldier bugs of the genus *Podisus*, as well as two other sucking bugs, *Perillus claudus* Say, and *Diplodus luridus* Stal, have been recorded as feeding upon the caterpillars.

FIGURE 19. A parasite, *Ephialtes* (*Pimpla*) *conquisitor* Say. Natural size.

In certain moist seasons when the caterpillars are prevalent, many of them are killed by a bacterial disease or "wilt". The caterpillars are sluggish and flabby, and die on trees, buildings and fences, or on the outside of the nests, where they remain in a shrunken condition.

Birds are always important natural factors in the reduction of insect pests, but the number of species of birds that eat large, hairy caterpillars is rather limited. However, the following are known to feed upon tent caterpillars to some extent:

black-billed cuckoo
yellow-billed cuckoo
catbird
crow
chickadee
blue jay
robin
brown thrasher
Baltimore oriole
red-winged blackbird
cedar waxwing
rose-breasted grosbeak
black and white warbler
golden-winged warbler
yellow warbler
redstart
chipping sparrow
field sparrow
white-throated sparrow
red-eyed vireo
yellow-throated vireo
house wren

It is said that a cold rain just after the eggs hatch kills many of the young caterpillars. Also, many caterpillars die from starvation.

* New York Agr. Expt. Station (Geneva) Bul. 152, page 290, 1898.

## CONTROL MEASURES

### Destroying the Eggs

During the winter much can be done to reduce the tent caterpillar population by destroying the egg-clusters. When the trees are bare, these can be seen near the ends of the twigs, and may easily be clipped off and burned. By means of a tree pruner with a long handle, (see Figure 20), the operator, while standing upon the ground, is able to remove the clusters that would otherwise be beyond his reach. These should then be gathered and burned.

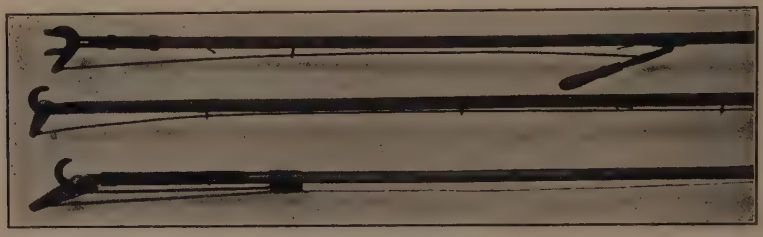

FIGURE 20. Tree pruners.

### Removing the Nests

**Brushing:** Many years ago the writer used to be sent through the orchards and along the roadsides and hedgerows with a brush mounted on the end of a pole to remove the nests from the trees. This work was done in the early morning or on a cloudy day when the caterpillars were in their tents. The brush was made of stiff bristles twisted in heavy wire and trimmed to the shape of a cone about six inches long. It was made for the purpose, and worked admirably. The operator stood upon the ground, inserted the point of the brush in the nest, gave it a few turns, and the entire nest with contents was wound upon the brush. Then the caterpillars were easily destroyed by crushing under foot.

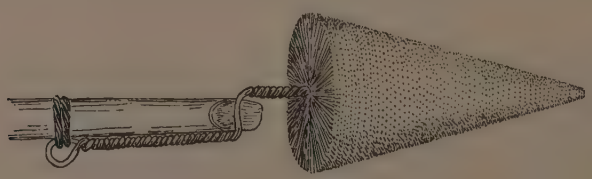

FIGURE 21. A caterpillar brush.

During recent years the writer has not been able to find this brush on the market, but this year, a Hartford brush manufacturer has made some samples after specifications furnished and will probably manufacture it in the future if there proves to be a demand. The appearance of the brush is shown in Figure 21.

In case a caterpillar brush is not at hand, four or six nails, 2 to 3 inches long, driven through the end of a pole, half of them at right angles to the others and with both ends projecting equally, will serve as a substitute.

**Burning:** Some fruit growers practice burning the nests on the trees and for this purpose an asbestos torch has been designed and manufactured. The torch is filled or covered with kerosene, lighted, and held under the nest when the caterpillars are inside. We do not recommend burning because there is danger of severe injury to the tree. Where the nests are near the ends of the branches, the damage may be very slight, but if they are in the forks of comparatively large branches, as is frequently the case, they cannot be burned without danger of killing or injuring these branches. Removing the nests with a caterpillar brush is just as expeditious as burning, and there is no damage to the trees.

### Spraying

Where the orchardist practices early spraying, no other remedy need be considered. Lead arsenate with or without nicotine, lime-sulfur or Bordeaux mixture, applied to the foliage, will kill the caterpillars when they feed upon the leaves. The chief difficulty lies in the fact that some of the caterpillars hatch and begin feeding as soon as the first leaves appear and before there is any leaf surface to poison. Consequently some damage may be done before spraying begins. But, as the caterpillars eat very little when small, this damage is not liable to be serious. The early colonies of caterpillars may easily be brushed from the trees, and the spray depended on to kill the later ones.

Three pounds of powdered lead arsenate should be used in each 100 gallons of spray mixture.

At Wilton, April 20, 1925, where a lime-sulfur spray had been applied, the young caterpillars were killed soon after hatching.

### Community Effort

Through cooperative effort any insect pest can be checked. It is usually the careless man who breeds destructive insects for his neighborhood. Each property owner and tenant should take care of such matters on the land which he owns or controls. In some European countries the owner is compelled to remove all destructive pests from his trees and shrubs, and similar laws are in force in Maine, Massachusetts and New Hampshire regarding the gypsy and brown-tail moths. If the land holder fails to do this, the State or town does it for him and he pays the cost in the form of taxes.

Some writers advise the destruction of all wild cherry and of seedling and worthless apple trees, which harbor the tent caterpillar in the hedgerows and along the roadsides. If the owner is not willing to destroy such trees, he certainly should keep them reasonably free of insect pests and not allow them to be a menace to neighboring orchards.

Many years ago Professor C. M. Weed recommended that children be given a small bounty for gathering egg-clusters, and cited a case in Newfields, N. H., where the local village improvement society offered the

children ten cents per hundred clusters. As a result, 8,250 egg-clusters were collected, and if each cluster contained 150 eggs, which is a small average, 1,237,500 eggs were destroyed at a cost of $8.25.*

Many similar contests have been conducted in Connecticut for the boy scouts, girl scouts and school children, usually sponsored by a local organization, such as the board of education, garden club, civic association or village improvement association.

Because of the prevalence of this insect in Connecticut in 1913, the Extension Service of the Connecticut State College at Storrs arranged a contest for school children in collecting egg-clusters before April 30, 1914. A prize of $25 was awarded the child collecting the largest number, and a scholarship in the summer school of the college, valued at $25, was awarded the teacher whose school collected the largest number. A certificate of appreciation was given to the child making the highest score in each town.

FIGURE 22. Sacks filled with a day's collection of nests ready to be burned. Newtown.

Supervisors were appointed to take charge of the matter. All egg-clusters were brought to the teacher, who credited each pupil with the number collected, and then destroyed them. In addition to these prizes, many individuals, schools, granges, village improvement associations and the like, offered prizes for the largest number of egg-clusters collected locally. All of these agencies working together induced the children to gather an enormous number of egg-clusters, amounting to more than 10,000,000, according to the records of the Extension Service.

Besides the inducement to collect egg-clusters, one of the Hartford daily newspapers offered prizes in three series for the best essays by school children on different phases of the life history of the tent caterpillar

* Division of Entomology, U. S. Dept. Agriculture, Bul. 17, new series, page 77, 1898.

and damage caused by it, or on their experiences in competing for the prizes. The writer served as judge in one of these literary contests. The best essays and portraits of the winning authors were afterward published in the newspaper.

A somewhat different form of contest was carried on by the Newtown High School in 1913. The principal offered $5 for the largest number of nests collected, $3 for the second, and $1 for the third highest. He counted, weighed and burned the nests each morning. One day's collection is shown in Figure 22. Altogether 16,864 nests, weighing about 1,300 pounds, were brought together and destroyed.

Again in 1935, campaigns were conducted in many localities for the destruction of egg-clusters. Nearly half a million were gathered in the vicinity of each of the towns of Danbury and New Milford.

Such efforts with their attendant publicity are beneficial because they serve to attract the attention of all citizens and property owners, as well as school children, to the subject of pest control, and help to educate the people regarding the life history of the pest. It would seem also that they would result in a substantial local reduction of a given pest, although it may be doubted if one could notice any marked decrease. However, it may fairly be assumed that the school children were benefited through their organized efforts toward a worthy objective, and in the training of their powers of observation and increased interest in the organisms of nature.

## SUMMARY

The eastern tent caterpillar is a native American insect that feeds upon the foliage of wild cherry and apple and forms nests in the forks of the branches in May. Every 10 or 11 years it is exceedingly abundant in Connecticut and defoliates trees, even in orchards. At such times the nests are conspicuous everywhere along the roadsides, and the trees are stripped of their leaves. New leaves are put out later in the season, but the trees are greatly weakened.

Outbreaks have occurred in Connecticut in 1902, 1913, 1924 and 1935. The insect occurs throughout the eastern United States and Canada, and westward to the Rocky Mountains. The usual food plants are wild cherry and apple, but when prevalent the caterpillars may feed upon other kinds of fruit trees, rose, witch-hazel, beech, barberry, oak, willow, poplar, birch and other trees and shrubs.

The eggs are laid in June and July on the small twigs of the food plant, and hatch the following April. The caterpillars from each egg-cluster live together in the same nest, and go out of it to feed, but are usually in the nest during the night and in stormy weather. They molt several times, become full grown in about six weeks and spin white, silken cocoons from which the adult moths emerge two weeks later. There is only one annual generation.

The small, gray eggs are deposited in clusters of 200 or more encircling the twigs, and covered with a brownish, glue-like substance. The mature caterpillar is two inches or more in length, blackish above and below, blue along the sides, and has a white stripe along the back. It is thinly covered with light brown hairs. The white cocoon is about an inch long

and half as thick. The adult is a reddish brown moth with two whitish stripes extending obliquely across each forewing. The female has a wingspread of about one and one-half, and the male about one and one-eighth, inches.

Several other insects of different habits and life histories are often confused with the tent caterpillar, chief among which are the bagworm, fall webworm and the forest tent caterpillar.

The eastern tent caterpillar in nature is checked by its natural enemies, chiefly by insect parasites and predators, a bacterial wilt disease, and by birds.

Control measures consist of: removing and burning the egg-clusters; removing the nests and destroying the caterpillars by crushing or burning; burning the nests on the trees, which may kill or injure the branches; spraying with lead arsenate.

In many communities contests have been conducted for the destruction of egg-clusters and nests, and prizes offered and awarded to boy and girl scouts and school children collecting the highest number. Property owners should remove all worthless trees and shrubs and keep all others free from the nests of the eastern tent caterpillar.

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